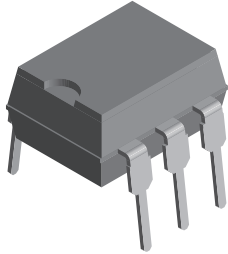
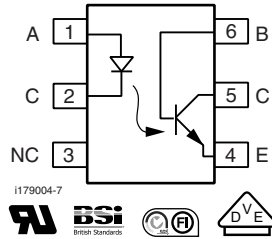


## Optocoupler, Phototransistor Output, Low Input Current, with Base Connection



i179004-3



i179004-7



### FEATURES

- Saturation CTR - MCT5211, > 100 % at  $I_F = 1.6 \text{ mA}$
- High isolation voltage, 5300  $V_{RMS}$
- Compliant to RoHS Directive 2002/95/EC and in accordance to WEEE 2002/96/EC


**RoHS**  
COMPLIANT

### AGENCY APPROVALS

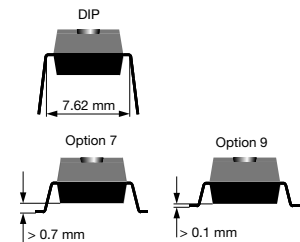
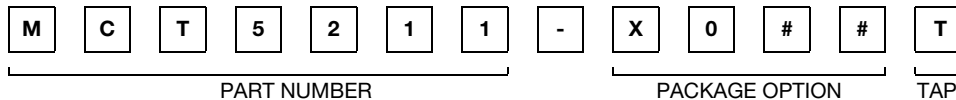
- UL1577, file no. E52744 system code H, double protection
- BSI IEC 60950; IEC 60065
- DIN EN 60747-5-2 (VDE 0884)/DIN EN 60747-5-5 (pending), available with option 1
- CSA 93751

### DESCRIPTION

The MCT5211 is a optocoupler with a high efficiency AlGaAs LED optically coupled to a NPN phototransistor. The high performance LED makes operation at low input currents practical. The coupler is housed in a six pin DIP package. Isolation test voltage is 5300  $V_{RMS}$ .

Because these parts have guaranteed CTRs at 1 mA and 3 mA, they are ideally suitable for interfacing from CMOS to TTL or LSTTL to TTL. They are also ideal for telecommunications applications such as ring or off-hook detection.

### ORDERING INFORMATION



AGENCY CERTIFIED/PACKAGE	CTR (%)
	1 mA
<b>UL, BSI, CSA</b>	<b>&gt; 110</b>
DIP-6	MCT5211
SMD-6, option 7	MCT5211-X007T <sup>(1)</sup>
SMD-6, option 9	MCT5211-X009T <sup>(1)</sup>
<b>UL, BSI, CSA, VDE</b>	<b>&gt; 110</b>
SMD-6, option 7	MCT5211-X017T

#### Note

- Additional options may be possible, please contact sales office.
- <sup>(1)</sup> Also available in tubes, do not put T on the end.

<b>ABSOLUTE MAXIMUM RATINGS</b> ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ , unless otherwise specified)				
PARAMETER	TEST CONDITION	SYMBOL	VALUE	UNIT
<b>INPUT</b>				
Peak reverse voltage		$V_R$	6	V
Forward continuous current		$I_F$	40	mA
Power dissipation		$P_{diss}$	75	mW
Derate linearly from 25 °C			1	mW/°C
<b>OUTPUT</b>				
Collector emitter breakdown voltage		$BV_{CEO}$	30	V
Emitter collector breakdown voltage		$BV_{ECO}$	7	V
Collector base breakdown voltage		$BV_{CBO}$	70	V
Power dissipation		$P_{diss}$	200	mW
Derate linearly from 25 °C			2.6	mW/°C
<b>COUPLER</b>				
Isolation test voltage		$V_{ISO}$	5300	$V_{RMS}$
Total package dissipation (LED and detector)		$P_{tot}$	260	mW
Derate linearly from 25 °C			3.5	mW/°C
Creepage distance			$\geq 7$	mm
Clearance distance			$\geq 7$	mm
Comparative tracking index per DIN IEC 112/VDE 0303, part 1		CTI	175	
Isolation resistance	$V_{IO} = 500\text{ V}, T_{amb} = 25\text{ }^{\circ}\text{C}$	$R_{IO}$	$\geq 10^{12}$	$\Omega$
	$V_{IO} = 500\text{ V}, T_{amb} = 100\text{ }^{\circ}\text{C}$	$R_{IO}$	$\geq 10^{11}$	$\Omega$
Operating temperature		$T_{amb}$	- 55 to + 100	°C
Storage temperature		$T_{stg}$	- 55 to + 150	°C

**Note**

- Stresses in excess of the absolute maximum ratings can cause permanent damage to the device. Functional operation of the device is not implied at these or any other conditions in excess of those given in the operational sections of this document. Exposure to absolute maximum ratings for extended periods of the time can adversely affect reliability.

<b>ELECTRICAL CHARACTERISTICS</b> ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ , unless otherwise specified)							
PARAMETER	TEST CONDITION	PART	SYMBOL	MIN.	TYP.	MAX.	UNIT
<b>INPUT</b>							
Forward voltage	$I_F = 5\text{ mA}$		$V_F$		1.2	1.5	V
Reverse voltage	$I_R = 10\text{ }\mu\text{A}$		$V_R$	6			V
<b>OUTPUT</b>							
DC forward current gain	$V_{CE} = 5\text{ V}, I_C = 100\text{ }\mu\text{A}$		$h_{FE}$	100	200		
Collector emitter breakdown voltage	$I_C = 100\text{ }\mu\text{A}$		$BV_{CEO}$	30			V
Emitter collector breakdown voltage	$I_E = 100\text{ }\mu\text{A}$		$BV_{ECO}$	7			V
Collector base breakdown voltage	$I_E = 10\text{ }\mu\text{A}$		$BV_{CBO}$	70			V
Collector emitter leakage voltage	$V_{CE} = 10\text{ V}$		$I_{CEO}$		5	100	nA
<b>COUPLER</b>							
Saturation voltage	$I_F = 1.6\text{ mA}, I_C = 1.6\text{ mA}$	MCT5211	$V_{CEsat}$		0.25	0.4	V

**Note**

- Minimum and maximum values are testing requirements. Typical values are characteristics of the device and are the result of engineering evaluation. Typical values are for information only and are not part of the testing requirements.

Optocoupler, Phototransistor Output, Low Input Current, with Base Connection Visay Semiconductors

<b>CURRENT TRANSFER RATIO</b> ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ , unless otherwise specified)							
PARAMETER	TEST CONDITION	PART	SYMBOL	MIN.	TYP.	MAX.	UNIT
Current transfer ratio (collector emitter saturated)	$V_{CE} = 0.4\text{ V}$ , $I_F = 1.6\text{ mA}$	MCT5211	$CTR_{CEsat}$	100	200		%
	$V_{CE} = 0.4\text{ V}$ , $I_F = 1\text{ mA}$	MCT5211	$CTR_{CEsat}$	75	150		%
Current transfer ratio	$V_{CE} = 5\text{ V}$ , $I_F = 1.6\text{ mA}$	MCT5211	CTR	150	300		%
	$V_{CE} = 5\text{ V}$ , $I_F = 1\text{ mA}$	MCT5211	CTR	110	225		%
Current transfer ratio (collector base)	$V_{CE} = 4.3\text{ V}$ , $I_F = 1.6\text{ mA}$	MCT5211	$CTR_{CB}$	0.3	0.6		%
	$V_{CE} = 4.3\text{ V}$ , $I_F = 1\text{ mA}$	MCT5211	$CTR_{CB}$	0.25	0.5		%

<b>SWITCHING CHARACTERISTICS</b> ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ , unless otherwise specified)							
PARAMETER	TEST CONDITION	PART	SYMBOL	MIN.	TYP.	MAX.	UNIT
Propagation delay high to low	$R_L = 750\text{ }\Omega$ , $I_F = 1.6\text{ mA}$ , $V_{CC} = 5\text{ V}$	MCT5211	$t_{PHL}$		20		$\mu\text{s}$
	$R_L = 1.5\text{ k}\Omega$ , $I_F = 1\text{ mA}$ , $V_{CC} = 5\text{ V}$	MCT5211	$t_{PHL}$		40		$\mu\text{s}$
Propagation delay low to high	$R_L = 750\text{ }\Omega$ , $I_F = 1.6\text{ mA}$ , $V_{CC} = 5\text{ V}$	MCT5211	$t_{PLH}$		20		$\mu\text{s}$
	$R_L = 1.5\text{ k}\Omega$ , $I_F = 1\text{ mA}$ , $V_{CC} = 5\text{ V}$	MCT5211	$t_{PLH}$		40		$\mu\text{s}$

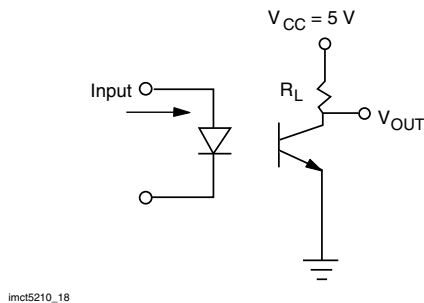


Fig. 1 - Switching Schematic

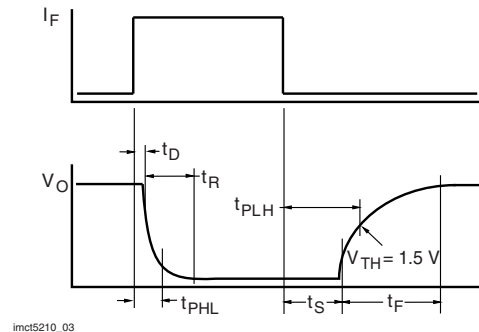


Fig. 2 - Switching Waveform

**TYPICAL CHARACTERISTICS** ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ , unless otherwise specified)

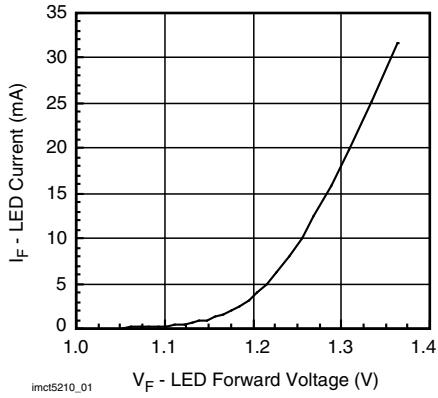


Fig. 3 - Forward Current vs. Forward Voltage

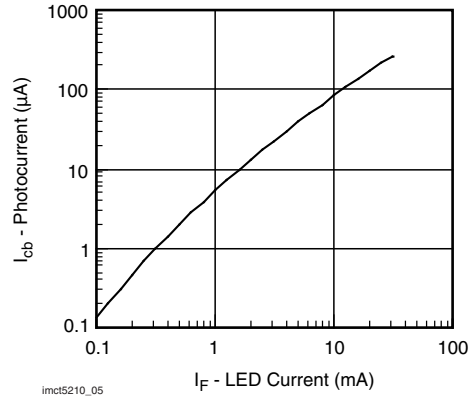


Fig. 6 - Photocurrent vs. LED Current

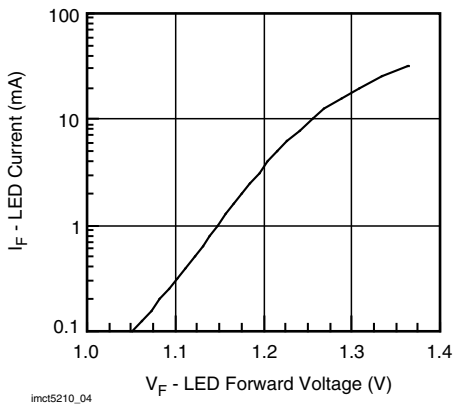


Fig. 4 - LED Forward Current vs. Forward Voltage

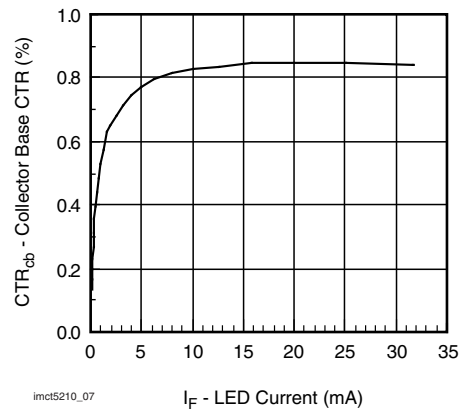


Fig. 7 - Collector Base CTR vs. LED Current

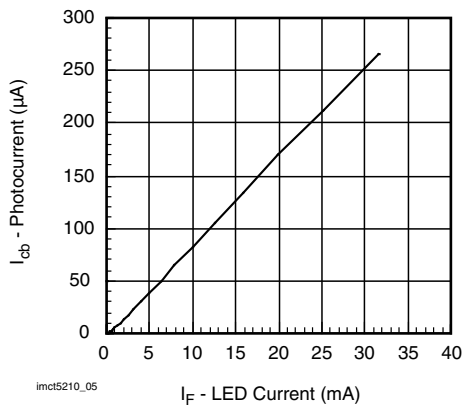


Fig. 5 - Collector Base Photocurrent vs. LED Current

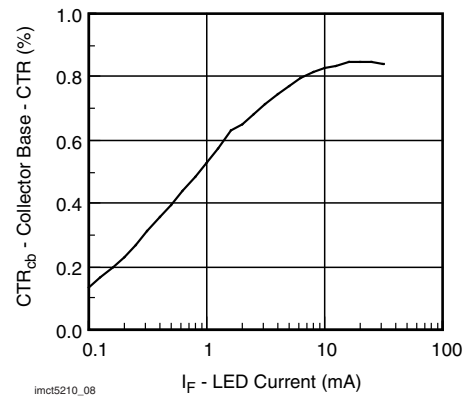


Fig. 8 - Collector Base CTR vs. LED Current

Optocoupler, Phototransistor Output, Low Input Current, with Base Connection Vishay Semiconductors

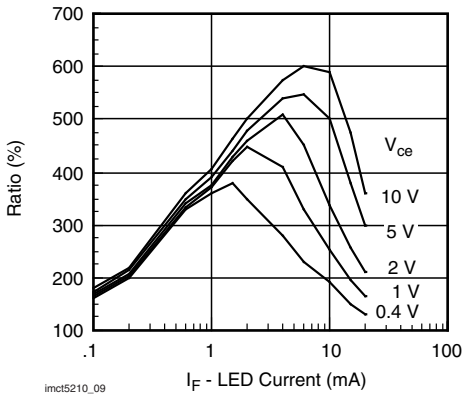


Fig. 9 - CTR vs. LED Current

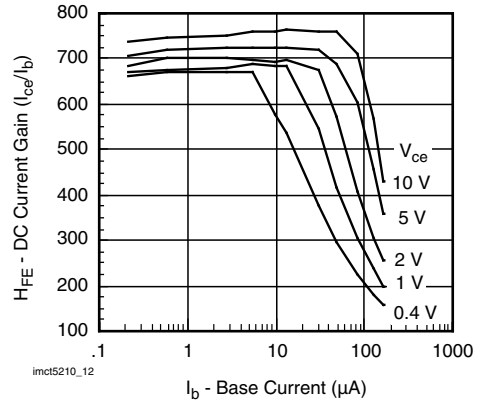


Fig. 12 - Transistor Current Gain vs. Base Current

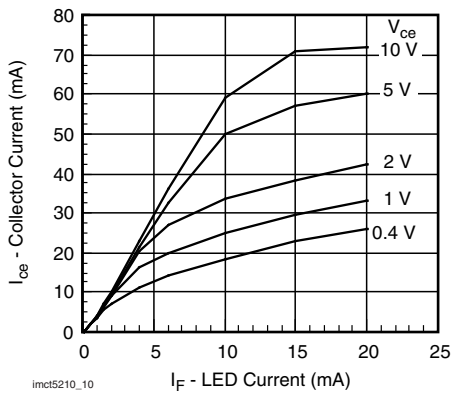


Fig. 10 - Collector Current vs. LED Current

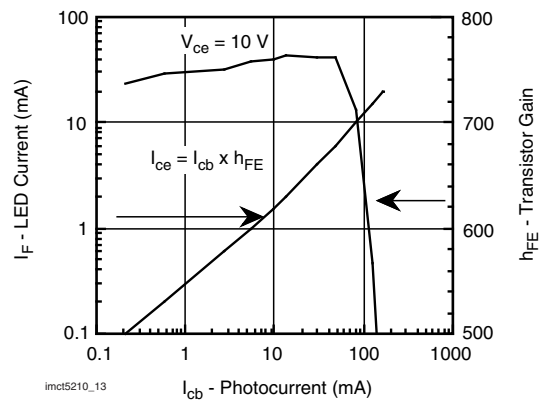


Fig. 13 - Transfer Curve

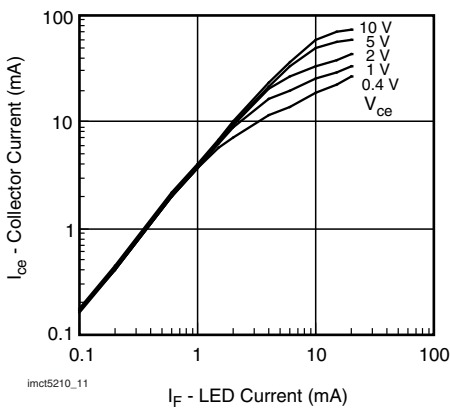


Fig. 11 - Collector Current vs. LED Current

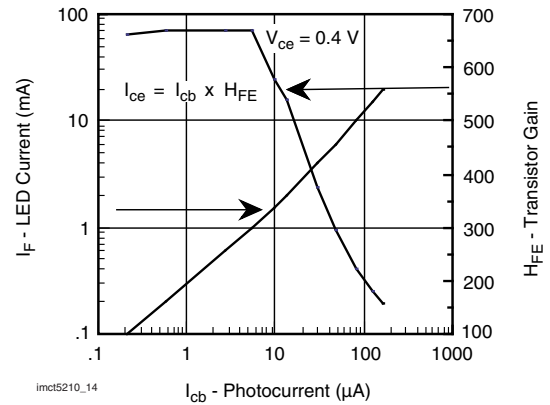


Fig. 14 - Transfer Curve

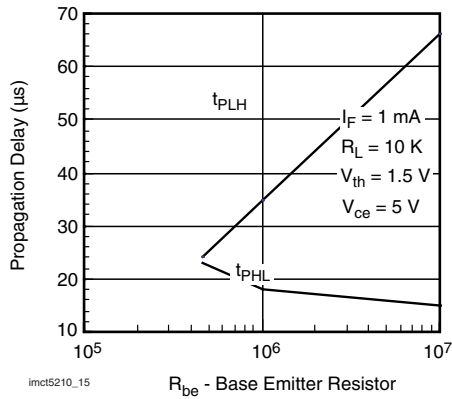


Fig. 15 - Propagation Delay vs. Base Emitter Resistor

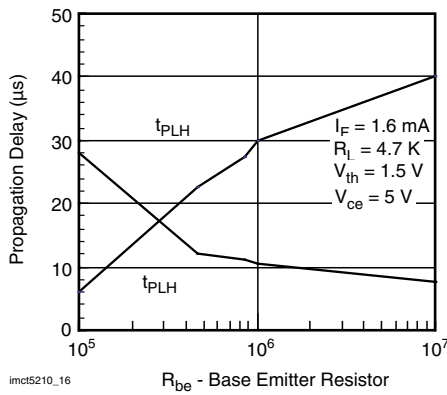


Fig. 16 - Propagation Delay vs. Base Emitter Resistor

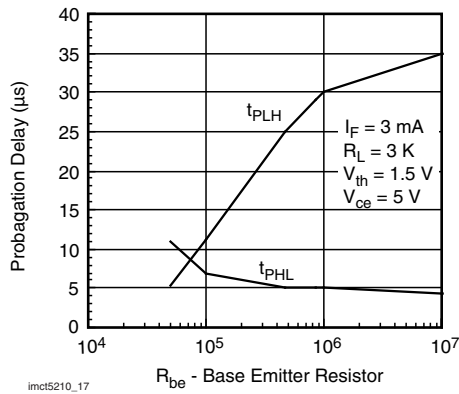


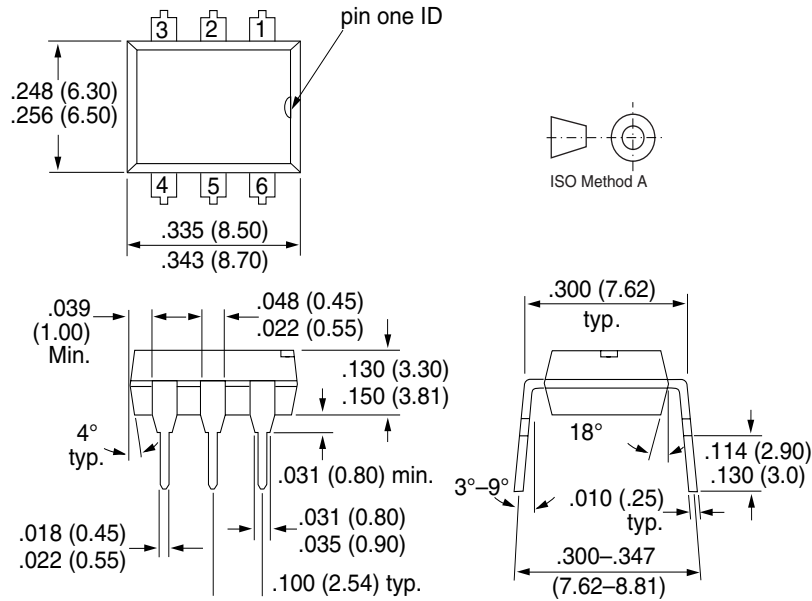
Fig. 17 - Propagation Delay vs. Base Emitter Resistor





## DIP-6A

### Package Dimensions in Inches (mm)



i178004



### Ozone Depleting Substances Policy Statement

It is the policy of **Vishay Semiconductor GmbH** to

1. Meet all present and future national and international statutory requirements.
2. Regularly and continuously improve the performance of our products, processes, distribution and operating systems with respect to their impact on the health and safety of our employees and the public, as well as their impact on the environment.

It is particular concern to control or eliminate releases of those substances into the atmosphere which are known as ozone depleting substances (ODSs).

The Montreal Protocol (1987) and its London Amendments (1990) intend to severely restrict the use of ODSs and forbid their use within the next ten years. Various national and international initiatives are pressing for an earlier ban on these substances.

**Vishay Semiconductor GmbH** has been able to use its policy of continuous improvements to eliminate the use of ODSs listed in the following documents.

1. Annex A, B and list of transitional substances of the Montreal Protocol and the London Amendments respectively
2. Class I and II ozone depleting substances in the Clean Air Act Amendments of 1990 by the Environmental Protection Agency (EPA) in the USA
3. Council Decision 88/540/EEC and 91/690/EEC Annex A, B and C (transitional substances) respectively.

**Vishay Semiconductor GmbH** can certify that our semiconductors are not manufactured with ozone depleting substances and do not contain such substances.

**We reserve the right to make changes to improve technical design  
and may do so without further notice.**

Parameters can vary in different applications. All operating parameters must be validated for each customer application by the customer. Should the buyer use Vishay Semiconductors products for any unintended or unauthorized application, the buyer shall indemnify Vishay Semiconductors against all claims, costs, damages, and expenses, arising out of, directly or indirectly, any claim of personal damage, injury or death associated with such unintended or unauthorized use.

Vishay Semiconductor GmbH, P.O.B. 3535, D-74025 Heilbronn, Germany  
Telephone: 49 (0)7131 67 2831, Fax number: 49 (0)7131 67 2423



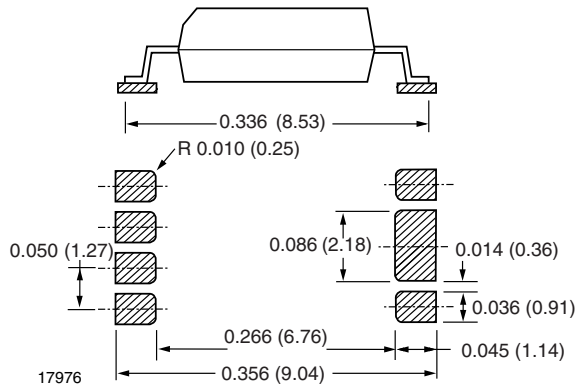


Fig. 5 - 8 Pin PCMCIA, Heat Sink

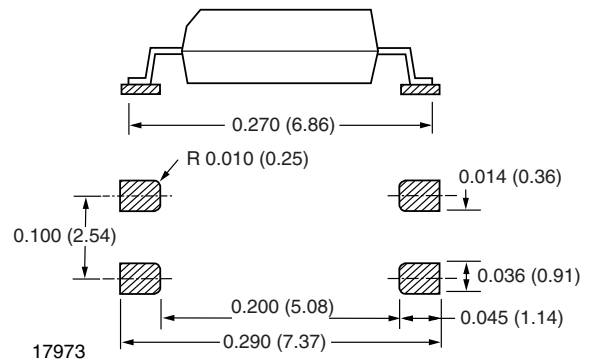


Fig. 8 - 4 Pin Mini-Flat

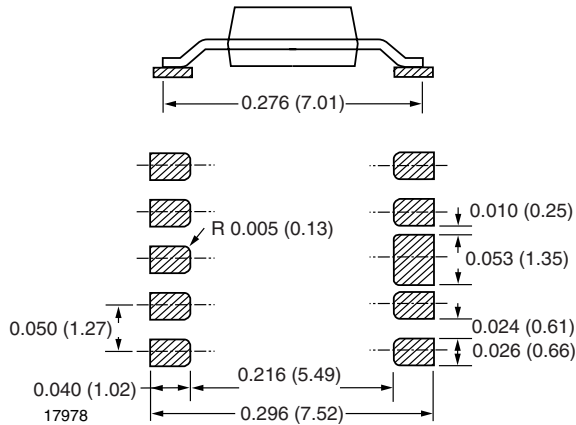


Fig. 6 - Mini Coupler

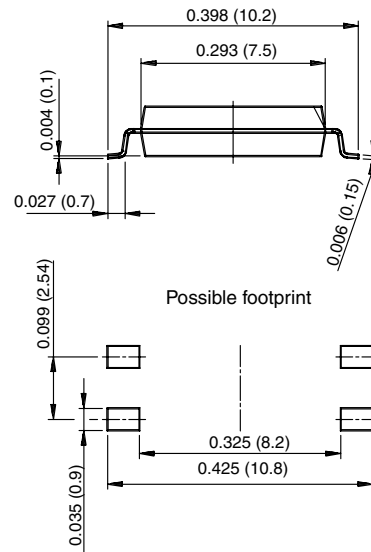


Fig. 9 - SOP-6, 4 Pin Wide Body

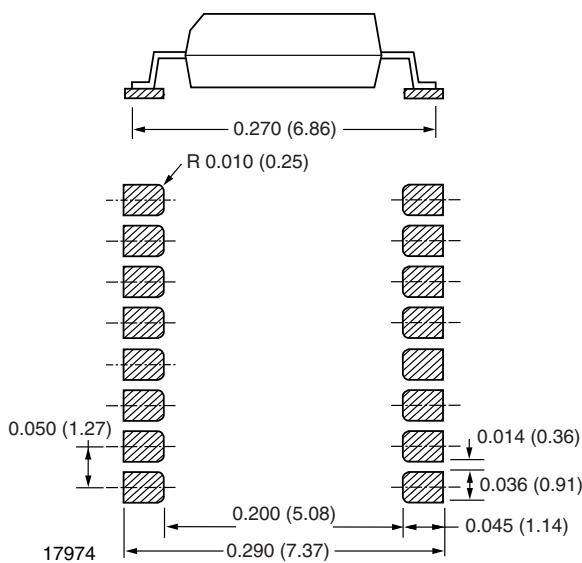


Fig. 7 - SOP-16

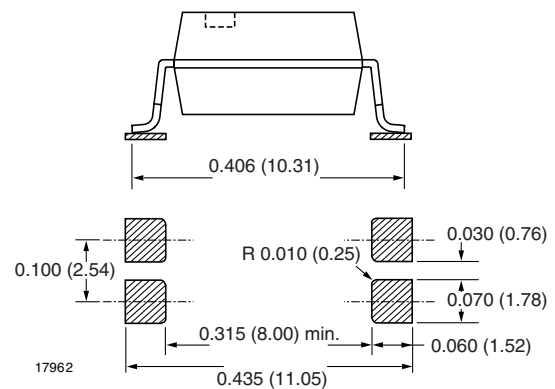


Fig. 10 - 4 Pin SMD Option 7

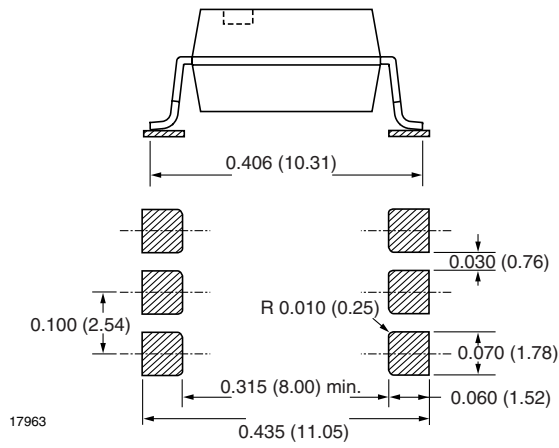


Fig. 11 - 6 Pin SMD Option 7

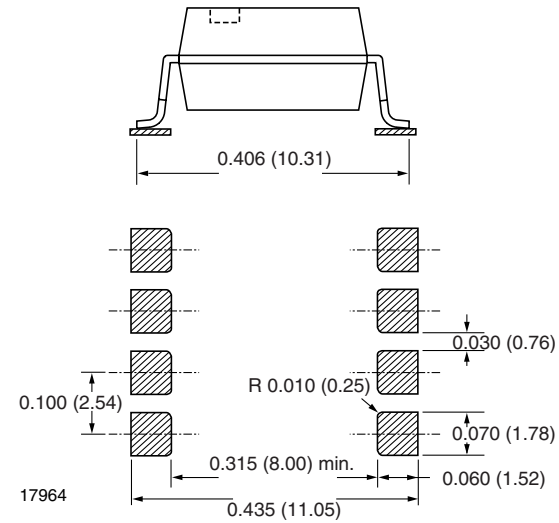


Fig. 12 - 8 Pin SMD Option 7

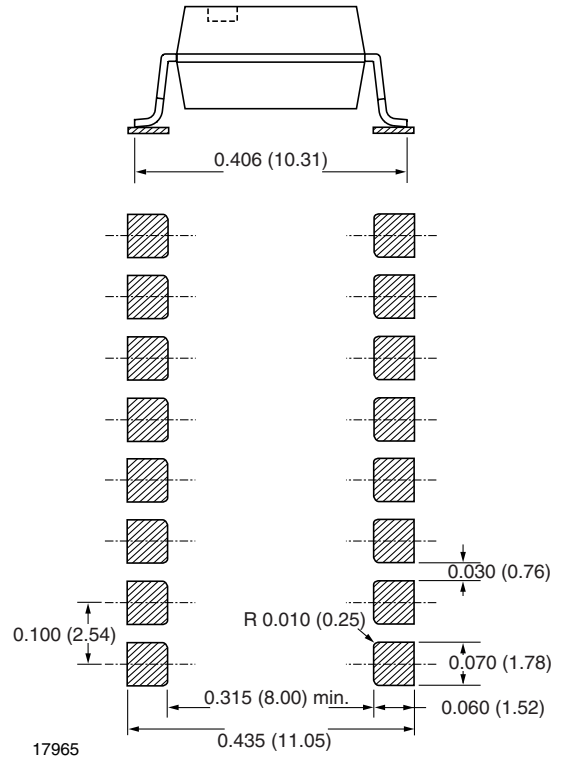


Fig. 13 - 16 Pin SMD Option 7

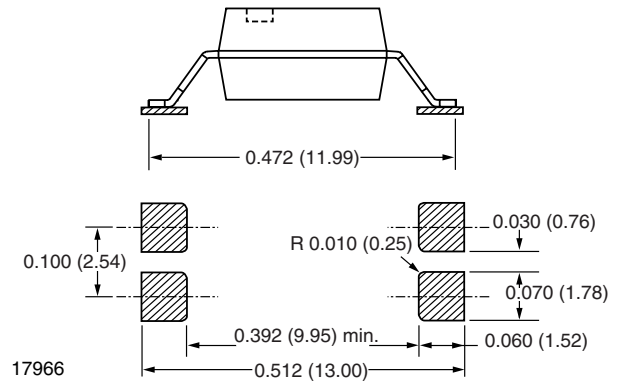


Fig. 14 - 4 Pin SMD Option 8

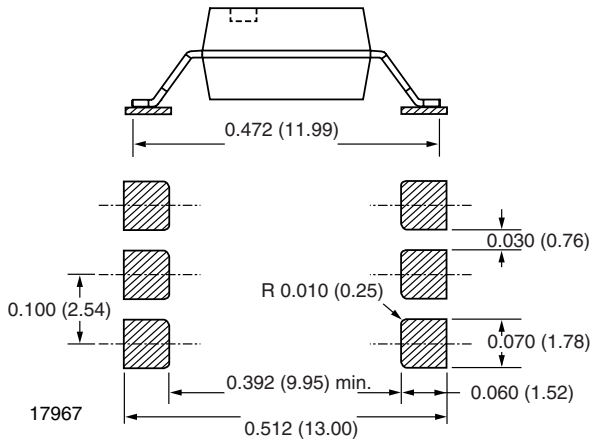


Fig. 15 - 6 Pin SMD Option 8

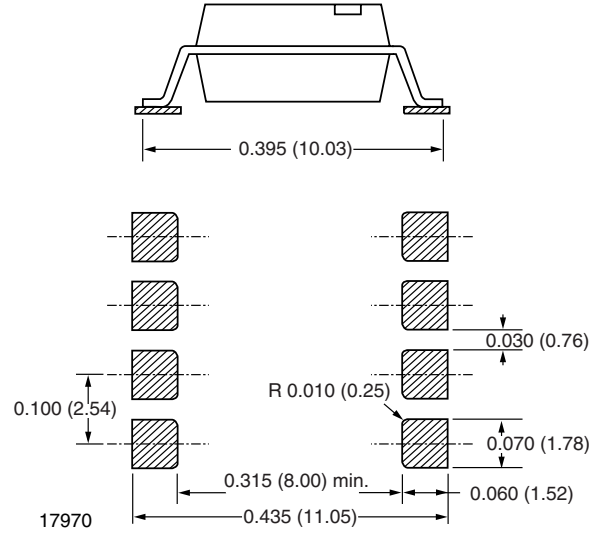


Fig. 18 - 8 Pin SMD Option 9

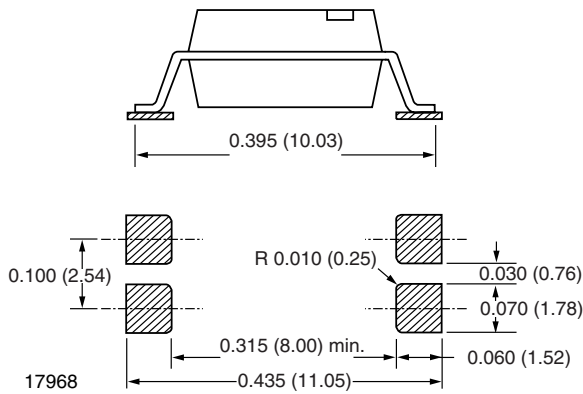


Fig. 16 - 4 Pin SMD Option 9

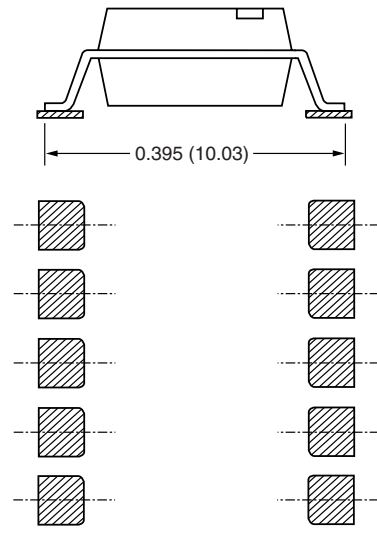


Fig. 19 - 16 Pin SMD Option 9

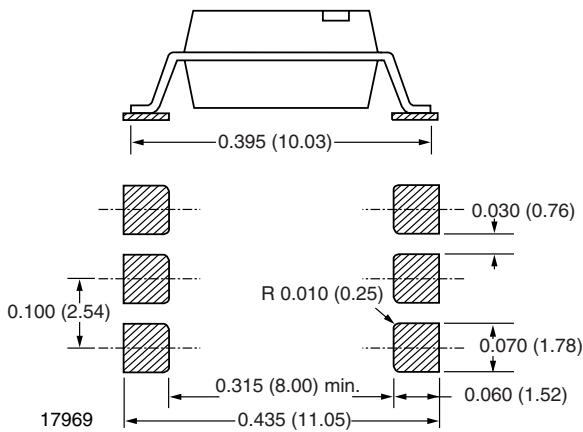


Fig. 17 - 6 Pin SMD Option 9

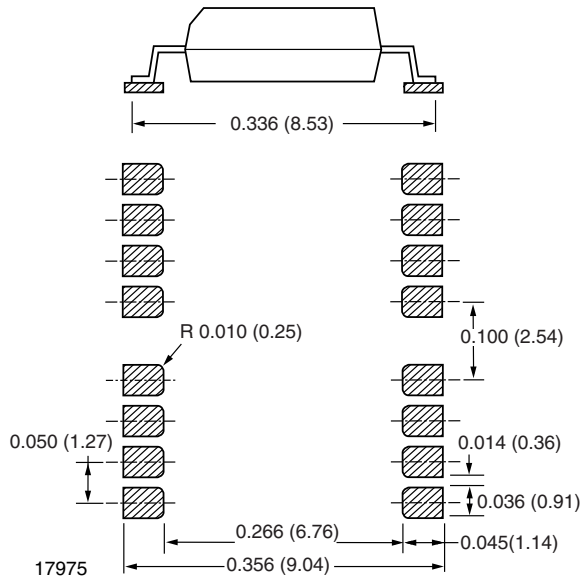


Fig. 20 - 16 Pin PCMCIA



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